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Amendment dated June 3, 2005
Responsive to Office Action dated March 3, 2005

IN THE CLAIMS:

1.   (currently amended) A method for processing in a diagnostics processor fault log data from a machine comprising a plurality of respective pieces of equipment, the method further processing operational parameter data indicative of operational and/or environmental conditions for the respective pieces of equipment, with said operational parameter data being encoded as fault log data to be processed by the diagnostics processor in combination with the fault log data to generate diagnostics information for the respective pieces of equipment, the method comprising:

processing fault log data comprising a plurality of faults from any malfunctioning piece of equipment, said processing configured to identify a plurality of distinct faults in the fault log data;

processing operational parameter data relatable to each respective time of occurrence of the plurality of faults from the malfunctioning equipment, said processing configured to access a plurality of data buckets comprising a plurality of states that may be assumed by each operational parameter;

generating at least one distinct fault cluster from the plurality of distinct faults;

encoding each generated fault cluster with a code indicative of a respective state of at least one operational parameter at the time of fault occurrence to provide at least one fault cluster encoded with operational parameter state data, which enables said at least one operational parameter to operate as fault log data when said at least one encoded fault cluster is processed;

processing a plurality of accumulated diagnostic cases to correlate a plurality of weighted repairs and distinct fault cluster combinations encoded with operational parameter state data; and

identifying at least one repair for the at least one fault cluster encoded with operational parameter state data using the plurality of weighted repair and distinct fault cluster combinations encoded with operational parameter state data.

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2.   (previously presented) The method of claim 1 wherein each data bucket is configured to capture and distinguish statistically-measurable influences on the performance of a given piece of equipment based on the respective state of each respective operational parameter.

3.   (previously presented) The method of claim 1 wherein each of the plurality of weighted repair and distinct fault cluster combinations is generated from a plurality of cases, each case comprising a repair and at least one distinct fault encoded with operational parameter state data.

4.   (previously presented) The method of claim 3 further comprising determining a respective weight for each of the plurality of weighted repair and distinct fault cluster combinations encoded with operational parameter state data.

5.   (previously presented) A method for processing fault log data from a machine comprising a plurality of respective pieces of equipment, the method further processing operational parameter data indicative of operational and/or environmental conditions for the respective pieces of equipment, the method comprising:

    collecting fault log data comprising a plurality of faults from any malfunctioning piece of equipment;

    collecting operational parameter data relatable to each respective time of occurrence of the plurality of faults from the malfunctioning equipment;

    identifying a plurality of distinct faults in the fault log data;

    identifying a plurality of data buckets indicative of respective levels of each operational parameter;

    generating at least one distinct fault cluster from the plurality of distinct faults;

    relating to each generated fault cluster a respective quantization of at least one operational parameter to provide at least one fault cluster configurable in at

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least one of the following cluster configurations: a stand-alone fault cluster configuration and a cluster configuration enhanced with quantized operational parameter data;

generating a plurality of weighted repair and distinct fault cluster combinations enhanceable with quantized operational parameter data, wherein each of the plurality of weighted repair and distinct fault cluster combinations is generated from a plurality of cases, each case comprising a repair and at least one distinct fault enhanceable with quantized operational parameter data;

determining a respective weight for each of the plurality of weighted repair and distinct fault cluster combinations enhanced with quantized operational parameter data, wherein said weight is determined by:

counting the number of times a respective fault cluster combination with quantized operational parameter data sharing a common quantization level for at least one operational parameter occurs in cases comprising related repairs;

counting the total number of times the combination with the common quantization level occurs in said plurality of cases; and

computing the ratio of the counted number of times the combination occurs in cases comprising related repairs over the counted number of times the combination occurs in the plurality of cases; and

identifying at least one repair for the at least one fault cluster enhanced with quantized operational parameter data using the plurality of weighted repair and distinct fault cluster combinations enhanceable with quantized operational parameter data.

6.   (original) The method of claim 1 wherein the operational parameter data comprises a plurality of snapshot observations of operational parameters from the pieces of equipment.

7.   (original) The method of claim 6 wherein the respective snapshot observations of operational parameters from the machine and the logging of respective faults from the machine are temporally aligned relative to one another.

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8.   (original) The method of claim 1 wherein the operational parameter data comprises a plurality of continuous observations of operational parameters from the machine.

9.   (previously presented) The method of claim 8 wherein the respective continuous observations of operational parameters from the machine and the logging of respective faults from the machine are temporally co-relatable to one another.

10.   (currently amended) A method for processing in a diagnostics processor fault log data from a machine comprising a plurality of respective pieces of equipment, the method further processing operational parameter data indicative of operational and/or environmental conditions for the respective pieces of equipment, with said operational parameter data being encoded as fault log data to be processed by the diagnostics processor in combination with the fault log data to generate diagnostics information for the respective pieces of equipment, the method comprising:

processing fault log data comprising a plurality of faults from any malfunctioning piece of equipment, said processing configured to identify a plurality of distinct faults in the fault log data;

processing operational parameter data relatable to each respective time of occurrence of the plurality of faults from the malfunctioning equipment, said processing configured to access a plurality of data buckets comprising a plurality of states that may be assumed by each operational parameter;

generating at least one distinct fault cluster from the plurality of distinct faults;

encoding each generated fault cluster with a code indicative of a respective state of at least one operational parameter at the time of fault occurrence to provide at least one fault cluster encoded with operational parameter state data, which enables said at least one operational parameter to

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operate as fault log data when said at least one encoded fault cluster is processed;

processing a plurality of accumulated diagnostic cases to correlate a plurality of weighted repairs and distinct fault cluster combinations encoded with operational parameter state data; and

predicting at least one repair for the at least one fault cluster encoded with operational parameter state data using the plurality of weighted repair and distinct fault cluster combinations encoded with operational parameter state data.

11. (previously presented) The method of claim 10 wherein each of the plurality of weighted repair and distinct fault cluster combinations is generated from a plurality of cases, each case comprising a repair and at least one distinct fault enhanced with operational parameter state data.

12. (previously presented) A method for processing fault log data from a machine comprising a plurality of respective pieces of equipment, the method further processing operational parameter data indicative of operational and/or environmental conditions for the respective pieces of equipment, the method comprising:

collecting fault log data comprising a plurality of faults from any malfunctioning piece of equipment;

collecting operational parameter data relatable to each respective time of occurrence of the plurality of faults from the malfunctioning equipment;

identifying a plurality of distinct faults in the fault log data;

identifying a plurality of data buckets indicative of respective levels of quantization of each operational parameter, wherein each data bucket is configured to distinguish measurable influences on the performance of a given piece of equipment based on to the quantization level of each operational parameter;

generating at least one distinct fault cluster from the plurality of distinct faults;

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relating to each generated fault cluster a respective quantization level of at least one operational parameter to provide at least one fault cluster configurable in at least one of the following cluster configurations: a stand-alone fault cluster configuration and a cluster configurations enhanced with quantized operational parameter data;

predicting at least one repair for the at least one fault cluster using a plurality of weighted repair and distinct fault cluster combinations enhanceable with quantized operational parameter data, wherein each of the plurality of weighted repairs and distinct fault cluster combinations is generated from a plurality of cases, each case comprising a repair and at least one distinct fault enhanced with quantized operational parameter data, and further wherein each of the plurality of weighted repair and distinct fault cluster combinations is assigned a weight, wherein said weight is determined by dividing the number of times a respective fault cluster combination sharing a common quantization level for at least one operational parameter occurs in cases comprising related repairs by the total number of times that combination occurs in said plurality of cases.

13. (currently amended) A system for processing in a diagnostics processor fault log data from a machine comprising a plurality of respective pieces of equipment, the system further processing operational parameter data indicative of operational and/or environmental conditions for the respective pieces of equipment, with said operational parameter data being encoded as fault log data to be processed by the diagnostics processor in combination with the fault log data to generate diagnostics information for the respective pieces of equipment, the system comprising:

a processor for processing fault log data comprising a plurality of faults from any malfunctioning piece of equipment, said processing configured to identify a plurality of distinct faults in the fault log data;

a processor for processing operational parameter data relatable to each respective time of occurrence of the plurality of faults from the malfunctioning equipment, said processing configured to access a plurality of data buckets

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comprising a plurality of states that may be assumed by each operational parameter;

a processor configured to generate at least one distinct fault cluster from the plurality of distinct faults;

a processor configured to encode each generated fault cluster with a code indicative of a respective state of at least one operational parameter at the time of fault occurrence to provide at least one fault cluster encoded with operational parameter state data, which enables said at least one operational parameter to operate as fault log data when said at least one encoded fault cluster is processed;

a processor configured to process a plurality of accumulated diagnostic cases to correlate a plurality of weighted repairs and distinct fault cluster combinations encoded with operational parameter state data; and

a processor configured to identify at least one repair for the at least one fault cluster encoded with operational parameter state data using the plurality of weighted repair and distinct fault cluster combinations encoded with operational parameter state data.

14. (previously presented) The system of claim 13 wherein each data bucket is configured to capture and distinguish statistically-measurable influences on the performance of a given piece of equipment based on the respective state of each respective operational parameter.

15. (previously presented) The system of claim 13 wherein each of the plurality of weighted repair and distinct fault cluster combinations is generated from a plurality of cases, each case comprising a repair and at least one distinct fault enhanced with operational parameter state data.

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16. (previously presented) The system of claim 15 further comprising a processor configured to determine a respective weight for each of the plurality of weighted repair and distinct fault cluster combinations enhanced with operational parameter state data.

17. (previously presented) A system for processing fault log data from a machine comprising a plurality of respective pieces of equipment, the system further processing operational parameter data indicative of operational and/or environmental conditions for the respective pieces of equipment, the system comprising:

a database for collecting fault log data comprising a plurality of faults from any malfunctioning piece of equipment;

a database for collecting operational parameter data relatable to each respective time of occurrence of the plurality of faults from the malfunctioning equipment;

a processor configured to identify a plurality of distinct faults in the fault log data;

a processor configured to identify a plurality of data buckets indicative of respective levels of quantization of each operational parameter;

a processor configured to generate at least one distinct fault cluster from the plurality of distinct faults;

a processor configured to relate to each generated fault cluster a respective quantization level of at least one operational parameter to provide at least one fault cluster configurable in at least one of the following cluster configurations: a stand-alone fault cluster configuration and a cluster configuration enhanced with quantized operational parameter data;

a processor configured to generate a plurality of weighted repair and distinct fault cluster combinations enhanceable with quantized operational parameter data, wherein each of the plurality of weighted repair and distinct fault cluster combinations is generated from a plurality of cases, each case comprising a repair and at least one distinct fault enhanceable with quantized operational

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parameter data;

a processor configured to determine a respective weight for each of the plurality of weighted repair and distinct fault cluster combinations enhanced with quantized operational parameter data, wherein said weight is determined by dividing the number of times a respective fault cluster combination with quantized operational parameter data sharing a common quantization level for at least operational parameter occurs in cases comprising related repairs by the total number of times the combination with the common quantization level occurs in said plurality of cases; and

a processor configured to identify at least one repair for the at least one fault cluster using the plurality of weighted repair and distinct fault cluster combinations enhanceable with quantized operational parameter data.

18. (original) The system of claim 13 wherein the operational parameter data comprises a plurality of snapshot observations of operational parameters from the pieces of equipment.

19. (original) The system of claim 18 wherein the respective snapshot observations of operational parameters from the machine and the logging of respective faults from the machine are temporally aligned relative to one another.

20. (original) The system of claim 13 wherein the operational parameter data comprises a plurality of continuous observations of operational parameters from the machine.

21. (previously presented) The system of claim 20 wherein the respective continuous observations of operational parameters from the machine and the logging of respective faults from the machine are temporally co-relatable to one another.

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22.   (currently amended) An article of manufacturing comprising a computer-readable medium including computer-readable program code for causing a computer to process in a diagnostics processor fault log data from a machine comprising a plurality of respective pieces of equipment, the computer-readable program code further causing the computer to process operational parameter data indicative of operational and/or environmental conditions for the respective pieces of equipment, with said operational parameter data being encoded <u>as fault log data</u> to be processed by the diagnostics processor in combination with the fault log data to generate diagnostic information for the respective pieces of equipment, the computer-readable program code in said article of manufacturing comprising:

computer-readable program code configurable to process fault log data comprising a plurality of faults from any malfunctioning piece of equipment, said processing configured to identify a plurality of distinct faults in the fault log data;

computer-readable program code configurable to process operational parameter data relatable to each respective time of occurrence of the plurality of faults from the malfunctioning equipment, said processing configured to access a plurality of data buckets comprising a plurality of states that may be assumed by each operational parameter;

computer-readable program code configurable to generate at least one distinct fault cluster from the plurality of distinct faults;

computer-readable program code configurable to encode each generated fault cluster with a code indicative of a respective state of at least one operational parameter at the time of fault occurrence to provide at least one fault cluster encoded with operational parameter state data<u>, which enables said at least one operational parameter to operate as fault log data when said at least one encoded fault cluster is processed</u>;

computer-readable program configurable to process a plurality of accumulated diagnostic cases to correlate a plurality of weighted repairs and distinct fault cluster combinations encoded with operational parameter state data; and

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computer-readable program code configurable to predict at least one repair for the at least one fault cluster encoded with operational parameter state data using the plurality of weighted repair and distinct fault cluster combinations encoded with operational parameter state data.

23. (previously presented) The article of manufacturing of claim 22 wherein each of the plurality of weighted repair and distinct fault cluster combinations is generated from a plurality of cases, each case comprising a repair and at least one distinct fault enhanced with operational parameter state data.

24. (previously presented) An article of manufacturing comprising a computer-readable medium including computer-readable program code for causing a computer to process fault log data from a machine comprising a plurality of respective pieces of equipment, the computer-readable program code further causing the computer to process operational parameter data indicative of operational and/or environmental conditions for the respective pieces of equipment, the computer-readable program code in said article of manufacturing comprising:

computer-readable program code configurable to collect fault log data comprising a plurality of faults from any malfunctioning piece of equipment;

computer-readable program code configurable to collect operational parameter data relatable to each respective time of occurrence of the plurality of faults from the malfunctioning equipment;

computer-readable program code configurable to identify a plurality of distinct faults in the fault log data;

computer-readable program code configurable to identify a plurality of data buckets indicative of respective levels of quantization of each operational parameter, wherein each data bucket is configurable to distinguish measurable influences on the performance of a given piece of equipment based on to the quantization level of each operational parameter;

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computer-readable program code configurable to generate at least one distinct fault cluster from the plurality of distinct faults;

computer-readable program code configurable to relate to each generated fault cluster a respective quantization level of at least one operational parameter to provide at least one fault cluster configurable in at least one of the following cluster configurations: a stand-alone fault cluster configuration and a cluster configuration enhanced with quantized operational parameter data; and

computer-readable program code configurable to predict at least one repair for the at least one fault cluster using a plurality of weighted repair and distinct fault cluster combinations enhanceable with quantized operational parameter data, wherein each of the plurality of weighted repair and distinct fault cluster combinations is generated from a plurality of cases, each case comprising a repair and at least one distinct fault enhanceable with quantized operational parameter data, and further wherein each of the plurality of weighted repair and distinct fault cluster combinations enhanced with quantized operational parameter data is assigned a weight, wherein said weight is determined by dividing the number of times the combination occurs in cases comprising related repairs by the total number of times a respective fault cluster combination sharing a common quantization level occurs in said plurality of cases.

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